

What we claim is:

1. A backlight for a liquid crystal display comprising:
an organic electroluminescent device; and
a cholesteric liquid crystal polarizing device.
2. The backlight of claim 1, further comprising a light recycling mechanism such that the theoretical maximum light efficiency of said backlight unit is about 100%.
3. A liquid crystal display comprising a backlight device as described in claim 1.
4. The backlight of claim 1 wherein said organic electroluminescent device comprises an organic electroluminescent material layer superposed between a cathode and an anode layer.
5. The backlight of claim 4 wherein said cathode is a metal and said anode layer is indium tin oxide.
6. The backlight of claim 4; wherein said cathode and said anode layer are connected to a power supply.
7. The backlight of claim 1 wherein said cholesteric liquid crystal polarizing device is a broadband polarizing device.
8. The backlight of claim 1 wherein said cholesteric liquid crystal polarizing device is a narrowband polarizing device.
9. The backlight of claim 1, wherein said cholesteric liquid crystal polarizing device includes a plurality of pixel regions.
10. The backlight of claim 9, said pixel regions being arranged in a repeating array of red pixels, green pixels and blue pixels, said red pixels reflecting circularly polarized red

light, said green pixels reflecting circularly polarized green light and said blue pixels reflecting circularly polarized blue light.

11. The backlight of claim 9, said pixel regions being arranged in a repeating array of red pixels, green pixels and blue pixels, said red pixels transmitting circularly polarized red light, said green pixels transmitting circularly polarized green light, and said blue pixels transmitting circularly polarized blue light.

12. The backlight of claim 11, wherein said cholesteric liquid crystal polarizing device comprises multiple cholesteric liquid crystal polarizing layers.

13. The backlight of claim 12, wherein said cholesteric liquid crystal polarizing device comprises three cholesteric liquid crystal polarizing layers; a first layer, a second layer and a third layer.

14. The backlight of claim 13, wherein said first layer is a broadband cholesteric liquid crystal polarizing layer and said second layer and said third layer are narrowband cholesteric liquid crystal polarizing layers.

15. The backlight of claim 14, wherein said second layer and said third layer each include a plurality of pixel regions

16. The backlight of claim 11, said backlight further comprising a diffuser element.

17. The backlight of claim 16, wherein said diffuser element is disposed between said anode layer and said cholesteric liquid crystal polarizing device.

18. The backlight of claim 11, said backlight further comprising a quarter-wave retarder, said quarter-wave retarder being disposed on the output side of said cholesteric liquid crystal polarizing device.

19. The backlight of claim 4, said backlight further comprising a microcavity from which microcavity resonance may be achieved, wherein said microcavity has a characteristic microcavity length.

20. The backlight of claim 19, further comprising a birefringent retarder layer, said birefringent retarder layer being disposed within said microcavity.

21. The backlight of claim 20, wherein said microcavity length is the optical pathlength from said cathode, through said organic electroluminescent material, said anode layer and said birefringent retarder layer to said cholesteric liquid crystal polarizing device.

22. The backlight of claim 20, wherein said birefringent retarder includes a plurality of pixel regions.

23. The backlight of claim 22, wherein the plurality of pixel regions include a first pixel region, a second pixel region, and a third pixel region, each having a mutually distinct birefringence values, being arranged in a repeating array, said birefringence value of said first pixel region being such that red emission from said microcavity is achieved, said birefringence value of said second pixel region being such that green emission from said microcavity is achieved, said birefringence value of said third pixel region being such that blue emission from said microcavity is achieved.

24. The backlight of claim 22, wherein said plurality of pixel regions includes a repeating array of red pixels, green pixels and blue pixels, said red pixels reflecting circularly polarized red light, said green pixels reflecting circularly polarized green light and said blue pixels reflecting circularly polarized blue light.

25. The backlight of claim 22, wherein said cholesteric liquid crystal device is a broadband polarizing device.

26. The backlight of claim 24 further comprising a quarter-wave plate, said quarter-wave plate being superposed on the output side of said cholesteric liquid crystal polarizing device.

27. The backlight of claim 25 further comprising a quarter-wave plate, said quarter-wave plate being superposed on the output side of said cholesteric liquid crystal polarizing device.

28. A backlight for a liquid crystal display comprising:

an organic electroluminescent device which includes a cathode superposed with an organic electroluminescent material, which is superposed with an anode layer;

a cholesteric liquid crystal polarizing device to selectively transmit and reflect circularly polarized light;

a diffuser element, said diffuser element being disposed between said anode layer and said cholesteric liquid crystal polarizing device;

a quarter-wave retarder, said quarter-wave retarder being disposed on an output side of said cholesteric liquid crystal polarizing device; and

a plurality of pixel regions arranged in a repeating array of red pixels, green pixels and blue pixels, said red pixels adapted to transmit red light, said green pixels adapted to transmit green light, and said blue pixels adapted to transmit blue light.

29. The backlight of claim 28, wherein the plurality of pixel regions are disposed within said cholesteric liquid crystal polarizing device, said pixel regions being arranged in a repeating array of red pixels, green pixels and blue pixels, said red pixels

transmitting circularly polarized red light, said green pixels transmitting circularly polarized green light, and said blue pixels transmitting circularly polarized blue light.

30. The backlight of claim 28, wherein the plurality of pixel regions are disposed within said retarder layer.

31. A liquid crystal display comprising a backlight as described in claim 28.

32. A method for fabricating a backlight for a liquid crystal display, said method comprising:

providing an organic electroluminescent device; and

superposing said organic electroluminescent device with a cholesteric liquid crystal polarizing device.

33. The method of claim 32, comprising the step of providing said cholesteric liquid crystal polarizing device with a plurality of pixel regions.

34. The method of claim 33, comprising the step of arranging the plurality of pixel regions in a repeating array of red pixels, green pixels and blue pixels, said red pixels transmitting circularly polarized red light, said green pixels transmitting circularly polarized green light, and said blue pixels transmitting circularly polarized blue light.

35. The method of claim 32, said method further comprising the step of providing a microcavity, said microcavity including a birefringent retarder disposed therein.

36. The method of claim 35, wherein said cholesteric liquid polarizing device is a broadband polarizing device.

37. The method of claim 35, comprising the step of providing said cholesteric liquid polarizing device with a plurality of pixel regions, said pixel regions being arranged in a repeating array of red pixels, green pixels and blue pixels, said red pixels reflecting

circularly polarized red light, said green pixels reflecting circularly polarized green light and said blue pixels reflecting circularly polarized blue light.

38. A backlight for a liquid crystal display comprising:

an organic electroluminescent means; and

a cholesteric liquid crystal polarizing means.